PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

VOL. X. JANUARY, 1866. No. 75.

Stated Meeting, January 5, 1866.

Present, twelve members.

Vice-President CRESSON, in the Chair.

Letters acknowledging the receipt of publications were received from the Imperial Institute of France, Paris, November 6th, 1865; Royal Society, London, October 12th, 1865; Geological Society of London, November 8th, 1865; Radcliff Observatory, Oxford, September 1st; Natural H. S., Newcastle on T., September 21st, 1865; Dr. John W. Dawson, Montreal, December 14th, 1865; American Antiquarian Society, December 22d, 1865; Corporation of Harvard College, December 29th, 1865; New York Historical Society, December 28th, 1865; New Jersey Historical Society, Newark, December 21st, 1865; Pennsylvania Historical Society, December 28th, 1865; Library of Congress, Washington, December 29th, 1865.

Donations for the Library were received from the Royal, Royal Astronomical, Royal Geographical, and Geological Societies in London; the Dublin Quarterly Journal of Science; the New Hampshire Adjutant-General and Quartermaster-General; James B. Francis, of New York; the Franklin Institute, Academy of Natural Sciences, and Pennsylvania Historical Society, of Philadelphia; and the United States Naval Observatory and Congressional Library.

Mr. Fraley announced the death of Col. C. D. Graham, U. S. A., at Boston.

Mr. Chase, after explaining the mechanical laws which appear to produce the differences between the European magnetic curves and the daily barometric curves delineated in Leverrier's "Bulletin International," presented a statement of his observations on skylight polarization at Philadelphia.

Recent observations with a Savart polariscope having led me to results which, while generally confirmatory, differ, in a few particulars, from those published by Sir David Brewster (Philosophical Mag. [4] 30, 118 and 166 Sqq.), I place some of them on record to facilitate a comparison with similar observations at other places.

1. In all the great circles which pass through the sun, the polarization of a clear sky is positive, except in the neighborhood of the solar and anti-solar points. If the polariscope is rotated from the positive maximum, the bands gradually diminish in brilliancy, vanishing at about 45°, and attaining a negative maximum at about 90°.

2. Within the primary lemniscates, of which the solar and anti-solar points are the respective centres, and the neutral points (actual or theoretical*) are the limits, the polarization of a clear sky is negative when the bands pass towards the sun's centre, vanishing when the bands are inclined 45° to the solar radii, and attaining a positive maximum when the inclination reaches 90°.

3. Arago's and Babinet's neutral points can be seen as well before sunrise as after sunset provided the atmospheric conditions are the same. Brewster gives the preference to the evening observation, but apparently for no other reason than that the sky is then generally clearer than in the morning. (Vol. cit. p. 118.)

4. I have repeatedly, and with little comparative difficulty, observed Brewster's neutral point. In the majority of cases, when the sun's altitude has been sufficient, I have been able to fix its position with nearly as much facility as that of Babinet's. (For the difficulties of Brewster and Babinet, see loc. cit. pp. 119, 166, 181.)

5. Within the solar primary lemniscate, it is frequently difficult to make any ordinary observation of the polarized bands, on account of the dazzling intensity of the light. But when the direct rays of the sun have been shut off by a thin disk (placed with its edge towards the eye, so that the polarization will not be affected by reflection from the surface of the disk), I have often been able to mark the

* There is one *theoretical* neutral point below the anti-solar point. It is probably never above the horizon when there is light enough to determine its position.

opposite polarizations and the position of the neutral points with perfect ease, even at midday.

6. In our climate it is by no means unusual to have days on which all the three neutral points can be observed, and their places determined. During the whole period of Brewster's observations at St. Andrew's he found but two such days, April 5th and 8th, 1842 (loc. cit. pp. 124, 163).

7. Quasi neutral lines, dividing bands of opposite polarization, can be found in nearly all parts of the sky by rotating the polariscope 45° from the line of maximum positive or negative polarization. But a slight additional rotation will show that the neutralization is only apparent.

8. The position of a true neutral point can be determined by sweeping its neighborhood alternately with the vertical and with the horizontal bands and marking the intersection of the lines of vanishing polarization.

9. In consequence of the arrangement of the lines of equal polarization, when the sky is swept with a polariscope for a few degrees on each side of a neutral point, the line which separates the oppositely polarized bands forms curves with a convexity determined by the position of the sun or the anti-solar point.*

10. Some of my observations have indicated an apparent correlation between these curves and the magnetic dip and terrestrial latitude. I have not been able to satisfy myself whether this correspondence was merely accidental, or whether it indicated another point of analogy between the laws of light and magnetism.

11. The varying effects of haze or cloud, appear, on the whole, to confirm Brewster's theory that the neutral point is produced "by the opposite action of light polarized by reflection and refraction." (See pp. 123, 169, 176, 178, 180.)

12. In one instance, soon after sunset, the reflection from scattered clouds in the neighborhood of the anti-solar point was such as to totally eclipse Arago's neutral point, the polarization being positive over the entire arch, from Babinet's neutral point to the eastern horizon.

The report of the Judges of the annual election held this day was read, and the following named officers were declared

* I am not sure whether this is the "singular effect" thus described by Brewster (loc. cit. p. 124). "In conveying the bands vertically round, the neutral line, in place of crossing them at a right angle, was the arc of a circle, to which one of the bands was a tangent." (See also pp. 121, 167.)

duly elected according to the laws, ordinances, and regulations of the Society for the ensuing year:

President.

George B. Wood.

Vice-Presidents.

John C. Cresson,
Isaac Lea,
George Sharswood.

Secretaries.

Charles B. Trego,
E. Otis Kendall,
John L. Le Conte,
J. Peter Lesley.

Members of the Council for Three Years.

Frederick Fraley,
Robert Patterson,
Daniel R. Goodwin,
Eli K. Price.

Curators.

Franklin Peale,
Elias Durand,
Joseph Carson.

Treasurer.

Charles B. Trego.

Prof. Lesley was nominated for Librarian.

Pending nominations Nos. 540 to 546 were read.

And the Society was adjourned.

Stated Meeting, January 19, 1866.

Present, fifteen members.

Dr. Wood, President, in the Chair.

Letters acknowledging the receipt of publications were received from the following Societies: